Advant Controller 31

Intelligent Decentralized
Automation System

Example program for 907 AC 1131
07 KT 9x with bar code scanner

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ABB STOTZ KONTAKT

1. Which components are required?

Hardware components:

- 1 x bar code scanner (Metrologic IS6520 incl. power supply unit with connector and cable)
- 1 x basic unit (07 KT 96, **07 KT 97**, 07 KT 98)
- 1 x power supply unit 24 V DC (e.g. **07 NG 34**)
- 1 x adapter between scanner and PLC
- 1 x programming cable for the basic unit (**07 SK 90**)

For configuration with terminal (not absolutely necessary)

- 1 x terminal (**MT45 with ARCNET driver**)
- 1 x programming cable for the terminal (**VB30**)
- 1 x ARCNET cable incl. two terminating resistors

Software:

- 1 x programming software for the basic unit 907 AC 1131
- 1 x example program for the basic unit (Barcodeleser_MT45ARCNET)

For configuration with terminal (not absolutely necessary)

- 1 x programming software for the terminal SPSPlus Win
- 1 x example program for the terminal (Barcodeleser_MT45Arcnet.MDB)

Miscellaneous equipment for programming:

- 1 x PC (see 907 AC 1131 part 2, programming and block library, installation)
- 1 x documentation:
  - 907 AC 1131 part 1 (hardware and system technology)
  - 907 AC 1131 part 2 (programming and libraries)
  - Metrologic "Installation and User's Guide"
  - Metrologic "Programming Manual"

For configuration with terminal (not absolutely necessary)

  - SAE planning manual
  - SAE device manual MT45

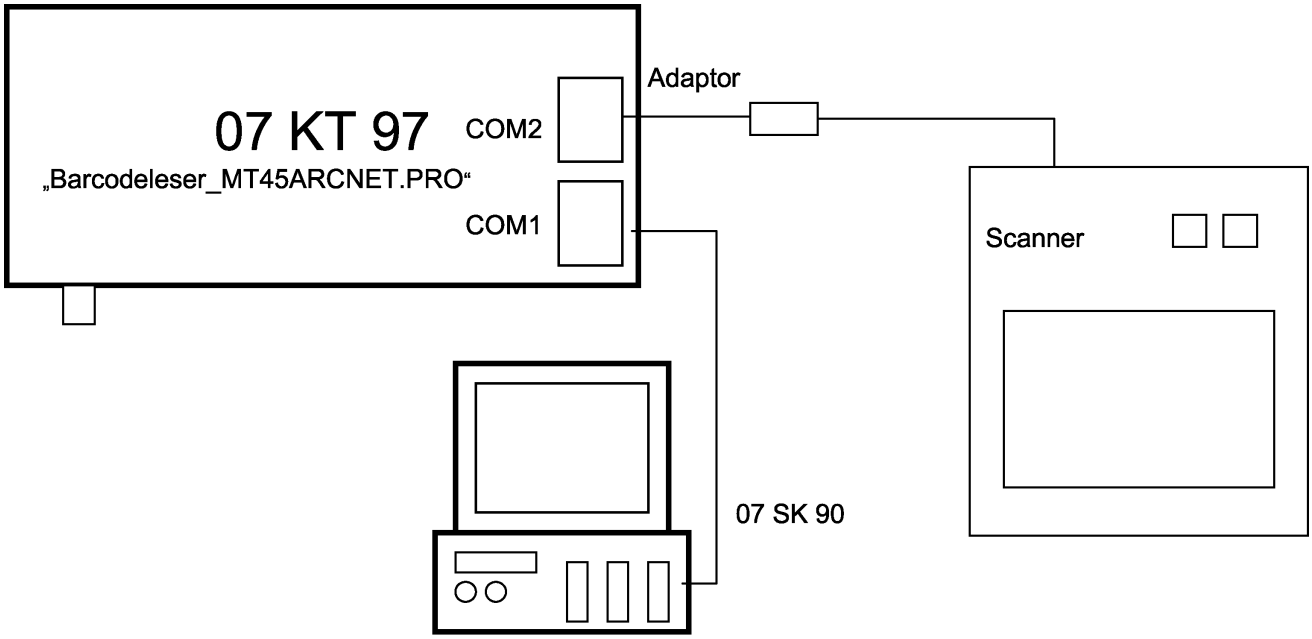
In the following description you will find several references to the documentation.

☞NOTE:
In this documentation all keyboard keys are enclosed by the characters < >.
Example: <F1> ... function key F1.
All menu items are put in quotation-marks, e.g. start page: "Start page".

2. Possible configurations

2.1. Minimum variant: PLC and scanner

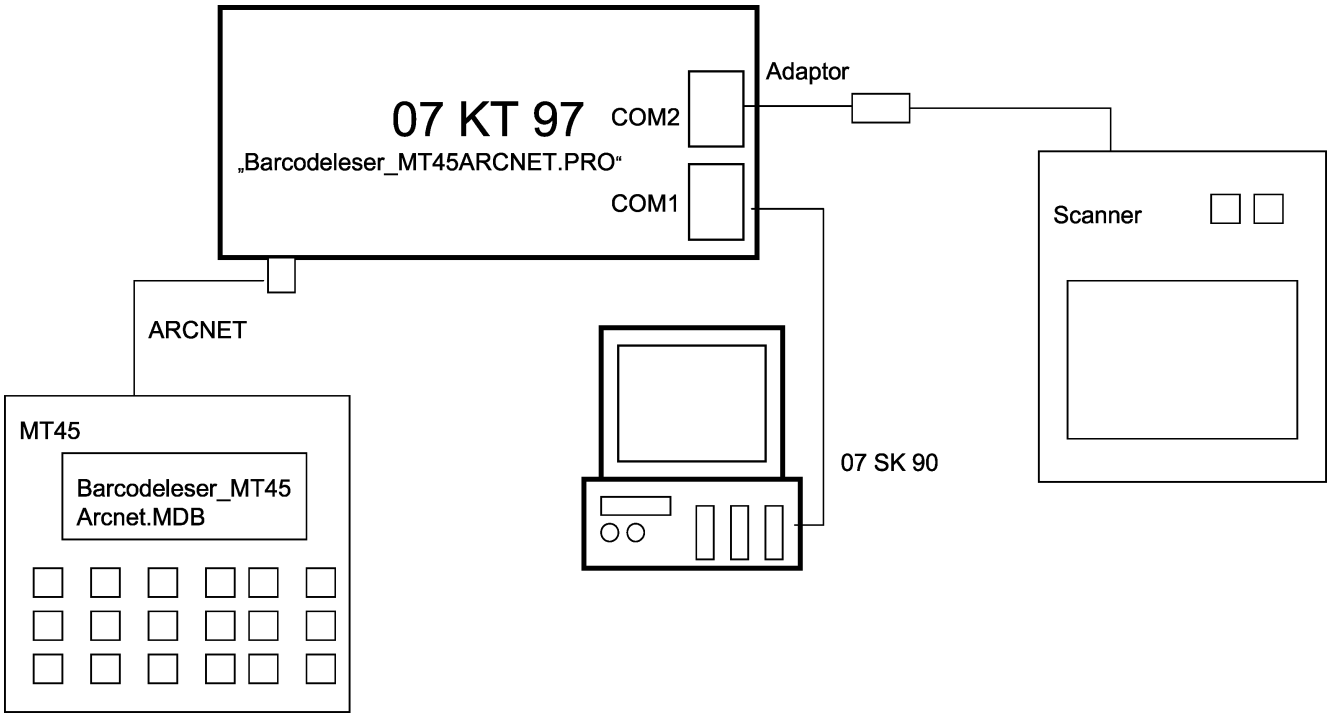
The minimum variant provides a complete configuration for testing the scanner functions. The scanned texts are directly read from the PLC via the programming software 907 AC 1131. The example program is prepared in a way that it is intended for the connection of a terminal via ARCNET. Nevertheless, it is fully functional even without an adaptation.



Minimum configuration: PLC and scanner

2.2 Comfort variant: PLC, scanner and terminal

The comfort variant also provides a complete configuration for testing the scanner functions. Additionally, the scanned texts can be comfortably viewed on the terminal which is connected to the PLC via ARCNET.



Extended configuration: PLC, scanner and terminal

3. Short instruction for commissioning the scanner program

☞NOTE: The following description exclusively refers to the scanner Metrologic IS6520. The procedure or the corresponding parameters required for other devices may differ.

3.1. Instructions for usage without terminal

1. Connect the scanner to the PLC by connecting the adapter between COM2 of the PLC and the serial connection of the scanner cable.

2. Supply the scanner with voltage (connect the cable of the power supply unit to the scanner cable and the power supply unit to 230 V AC; refer to Metrologic manual "Installation and User's Guide").

3. Set the scanner parameters:
   For this purpose, refer to the programming manual of the scanner. The following codes have to be held in front of the scanning window one after the other. A beep tone indicates that the scanner has successfully read the bar code.

   Codes in the foreword
   - ENTER/EXIT PROGRAM MODE — The scanner is switched to programming mode. During programming mode the LEDs are alternately flashing red and green.
   - RECALL DEFAULTS — The scanner is set to its default values.

   Codes in chapter "G Scanner Operation"
   - Enable Communications Timeouts

   Codes in chapter "H RS-232 Parameters"
   - No Parity
   - 9600 Baud Rate
   - 8 Data Bits
   - 1 Stop Bit
   - Disable DTR Support
   - Disable RTS/CTS Handshaking
   - Ignore BEL/CAN in ACK/NAK
   - Disable French PC Term

   Codes in the foreword
   - ENTER/EXIT PROGRAM MODE — The scanner is switched back to scanning mode. During scanning mode the green LED is on.

4. Connect the PLC to 24 V DC, copy the demo program, store it in the flash memory and then start it.

The green LED on the scanner indicates that it is ready for scanning. You can now hold any available bar code of your choice in front of the scanning window (CDs, floppy disks, bottles, Tetra Packs, etc). Every time the scanner has successfully read the bar code a beep tone sounds.

3.2. Instructions for usage with a terminal

1. Connect the scanner to the PLC by connecting the adapter between COM2 of the PLC and the serial connection of the scanner cable.

2. Supply the scanner with voltage (connect the cable of the power supply unit to the scanner cable and the power supply unit to 230 V AC; refer to Metrologic manual "Installation and User's Guide").

3. Set the scanner parameters:
   For this purpose, refer to the programming manual of the scanner. The following codes have to be held in front of the scanning window one after the other. A beep tone indicates that the scanner has successfully read the bar code.

   Codes in the foreword
   - ENTER/EXIT PROGRAM MODE — The scanner is switched to programming mode. During programming mode the LEDs are alternately flashing red and green.
   - RECALL DEFAULTS — The scanner is set to its default values.

   Codes in chapter "G Scanner Operation"
   - Enable Communications Timeouts

   Codes in chapter "H RS-232 Parameters"
   - No Parity
   - 9600 Baud Rate
   - 8 Data Bits
   - 1 Stop Bit
   - Disable DTR Support
   - Disable RTS/CTS Handshaking
   - Ignore BEL/CAN in ACK/NAK
   - Disable French PC Term

   Codes in the foreword
   - ENTER/EXIT PROGRAM MODE — The scanner is switched back to scanning mode. During scanning mode the green LED is on.

5. Set NODE number 1 (DIL switch 8 to position ON) at the PLC, connect the PLC to 24 V DC, copy, flash and start the demo program.

6. Set NODE number 2 (DIL switch 2 to position ON) at the terminal and supply the MT45 with 24 V DC.

7. Set the MT to data transfer mode:
   - Press the keys ENTER <→> and ESC </> simultaneously.
   - Step through the menu with ENTER <→> (password: 00000) until the item Texts/system programming is reached.
   - Then set the baud rate for example to 57600 and press ENTER <→>.

8. Connect the ARCNET cable between PLC and terminal.

9. Connect the programming cable between PC (e.g. COM2) and MT (X2) (original VB30).

10. Load the project into the MT:
    Open the project.
    - Call the project transfer.
    - The code generator is opened. Press "NO" if you are asked for the bitmaps.
    - Confirm the ready message with "OK".
    - Set the transfer interface (e.g. COM 2, 57600 baud – same setting as for the MT) and confirm with "OK".
    - Question whether the system should also be loaded: The first time this message is displayed it must be confirmed with "YES". If the system has already been transferred this question can be answered with "NO".

11. If still no communication is possible, reboot the complete system by performing a cold start (voltage OFF/ON).

The green LED on the scanner indicates that it is ready for scanning. You can now hold any available bar code of your choice in front of the scanning window (CDs, floppy disks, bottles, Tetra Packs, etc). Every time the scanner has successfully read the bar code a beep tone sounds.

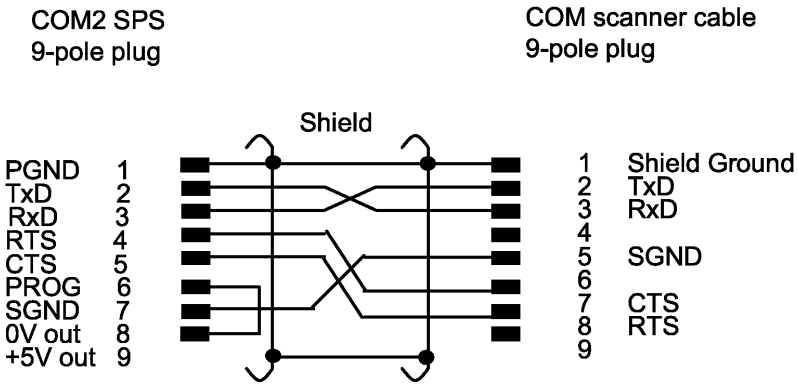
4. The following steps have to be carried out

☞NOTE: All items marked with an **asterisk (*) are only to be carried out if a terminal is connected.**

- Connecting the scanner to the PLC
- Supplying the scanner with voltage
- Setting the scanner parameters
- Setting the ARCNET addresses at the terminal and the basic unit *
- Supplying the basic unit with 24 V DC (power supply unit) and switching it on
- Supplying the terminal with 24 V DC (power supply unit) and switching it on *
- Connecting the ARCNET cable between PLC and terminal *
- Connecting the programming cable VB30 to the terminal MT45 (X2) and the PC *
- Copying the example program for the terminal *
- Connecting the programming cable 07 SK 90 to COM1 of the basic unit and to the PC
- Copying the example program for the basic unit
- Testing the program

4.1. Connecting the scanner to the PLC

First connect the scanner to the PLC. For this purpose an adapter with the following pin assignment has to be prepared.



Adaptor between PLC and scanner cable

This adapter has to be connected to COM2 of the PLC and to the serial connection of the scanner cable. The scanner cable is permanently mounted to the scanner.

4.2. Supplying the scanner with voltage

The scanner is delivered with a power supply unit (5 V DC) incl. a connector. *First connect the power supply unit to the scanner (insert the cable with the 5 V connector from the power supply unit to the socket of the scanner cable). Refer to Metrologic "Installation and User's Guide".*
Then plug the mains connector into the socket. After the scanner is initialized, the green LED is on, indicating that the device is ready for scanning.

4.3. Setting the scanner parameters

The programming of the scanner is done using bar codes. The bar codes for programming can be found in the *programming manual* of the scanner. The following codes have to be held in front of the scanning window one after the other. Please note that the scanner requires a certain distance to the bar code to properly recognize the bar code. A beep tone indicates that the scanner has successfully read the bar code.

Codes in the foreword

- ENTER/EXIT PROGRAM MODE — The scanner is switched to programming mode. During programming mode the LEDs are alternately flashing red and green.
- RECALL DEFAULTS — The scanner is set to its default values.

Codes in chapter "G Scanner Operation"

- Enable Communications Timeouts

Codes in chapter "H RS-232 Parameters"

- No Parity
- 9600 Baud Rate
- 8 Data Bits
- 1 Stop Bit
- Disable DTR Support
- Disable RTS/CTS Handshaking
- Ignore BEL/CAN in ACK/NAK
- Disable French PC Term

Codes in the foreword

- ENTER/EXIT PROGRAM MODE — The scanner is switched back to scanning mode. During scanning mode the green LED is on.

The green LED on the scanner indicates that it is ready for scanning. You can now hold any available bar code of your choice in front of the scanning window (CDs, floppy disks, bottles, Tetra Packs, etc). Every time the scanner has successfully read the bar code a beep tone sounds.

4.4. Setting the ARCNET addresses at the terminal and the basic unit

This section may only be carried out if you want to use a terminal.
First the ARCNET addresses (NODE numbers) of the devices have to be set.
Basic unit: The basic unit is set to NODE number 1. For this, set DIL switch 8 to ON; all other switches remain in the OFF position.
Terminal: The terminal is set to NODE number 2. For this, set DIL switch S2 no. 2 to ON; all other switches remain in the OFF position.

4.5. Supplying the basic unit with 24 V DC (power supply unit) and switching it on

The basic unit is supplied with 24 V DC. For this purpose, ground potential has to be connected to terminal (M) of the basic unit and 24 V DC has to be connected to terminal (L+). (See documentation 907 AC 1131 part 1, basic units, connection of supply voltage.)
Switch on the supply voltage.

4.6. Supplying the terminal with 24 V DC (power supply unit) and switching it on

This section may only be carried out if you want to use a terminal.
If you want to connect a terminal, this terminal must also be supplied with 24 V DC. At the terminal 0 V has to be connected to X1-M and 24 V DC to X1-L+. (See documentation SAE device manual).
Switch on the supply voltage.

4.7. Connecting the ARCNET cable between PLC and terminal

This section may only be carried out if you want to use a terminal.
Please use a coaxial cable with a characteristic impedance of 93Ω. At both cable ends a terminating resistor of 93Ω has to be installed (refer to documentation 907 AC 1131 part 1, ARCNET descriptions). Connect this cable to the corresponding connectors.

4.8. Connecting the programming cable to the terminal and the PC

This section may only be carried out if you want to use a terminal.
The programming cable VB30 connects the terminal MT45 to the PC. The 25-pole plug of this cable has to be connected to X2 of the MT45. The other cable end has to be connected to the serial interface of the PC (e.g. COM2). (See documentation SAE device manual).

4.9. Copying the example program for the terminal

This section may only be carried out if you want to use a terminal.
First, the terminal has to be prepared for the data transfer as follows:

- Press the keys *ENTER* <→> and *ESC* <*II*> simultaneously.

- The following menu inquiries appear which have to be confirmed with ENTER <→>:
  - Language – English: <*ENTER*>
  - Password: *00000* <*ENTER*>
  - Change password – NO: <*ENTER*>
  - Input of date/time: <*ENTER*>
  - Texts/system programming: - Set the required baud rate by pressing the *Cursor key* <*up*> (e.g. *57600/8/1/E;* this setting must be equal to the setting for the transfer rate in SPSPlus Win.)
    - Confirm with <*ENTER*>

Now the terminal is ready for programming.
(See documentation SAE device manual).
After this, start the programming software SPSPlus Win on the PC and perform the following steps:

- Open the file *Barcodeleser_MT45Arcnet.MDB* by selecting the menu item <*File*><*Open*>.

- First activate the code generator by selecting the menu item <*Project*><*Transfer*>. Press <*NO*> if the question "Möchten Sie die statischen Texte als Bitmap erstellen?" is displayed.

- The program code is generated and the message "Das Projekt wurde erfolgreich generiert" is displayed. Confirm with <*OK*>.

- The download window is opened. In the tab "Übertragung" set the interface and the baud rate (in our example *COM2* and *57600* baud) and confirm the settings with <*OK*>.

- Now the message "Möchten Sie das System auch herunterladen?" is displayed. The first time this message is displayed confirm it with <*YES*> because the selected system settings also have to be transferred. If you did not change the system settings you can later answer this question with <*NO*>.

- Now the program is transferred to the terminal.
  – With the message "Download erfolgreich beendet" SPSPlus Win signalizes the successful data transfer. Confirm this message with <*OK*> to return to the programming interface.
  – After a successful download the terminal performs a self test and changes automatically into the PLC mode. After that the message "Fehler 300 Kommunikationsfehler" is displayed. Ignore this message at the moment.

- For safety reasons it is now checked whether the interface at the terminal is set correctly. At the terminal open the menu and proceed as follows:
  Press the keys ENTER <→> and <*ESC*> <//> simultaneously
  - Language – English: <*ENTER*>
  - Password: *00000* <*ENTER*>
  - Change password – NO: <*ENTER*>
  - Input of date/time: <*ENTER*>
  - Texts/system programming: <*ENTER*>
  - Change printer – NO: <*ENTER*>
  - Change COM1 – NO: <*ENTER*>
  - Enter the UST (*UST is the ARCNET address of the PLC (Node)*): *01* <*ENTER*>
  - Step through the menu by pressing <*ENTER*> until the item Konfiguration speichern is displayed. Set this parameter to YES and press <*ENTER*>

(See also planning manual SPSPlus Win – Transferring project data)

4.10. Connecting the programming cable to the basic unit and the PC

The programming cable 07 SK 90 connects the PLC to the PC. The 9-pole plug of this cable has to be connected to COM1 of the 07 KT 9x. The other cable end has to be connected to the PC's serial interface (e.g. COM1).
(See documentation 907 AC 1131 part 1, interface cable 07 SK 90.)

4.11. Copying the example program for the basic unit

Before copying the example program you have to make sure that the PLC is supplied with voltage, that the programming cable is connected and that the PC is running. First, start the 907 AC 1131 programming software on the PC. Then, continue as follows:

- Open the example program "*Barcodeleser_MT45ARCNET.pro*" by selecting the menu item <*File*> <*Open*>.
- Prior to sending the example program to the basic unit, it has to be compiled. For that purpose press <*F11*>.
- Now the communication parameters have to be installed. Using the menu item <*Online*> <*Communication parameters*> the corresponding interface parameters can be set. In our example the driver ABB RS232 was installed on *COM1* (*19200 baud, no parity, 1 stop bit*). If you are using COM 2, only change the "Port" parameter.
- In the menu <*Online*> <*Login*> you have to activate the sending process. Confirm the information about the existing program stored on the PLC with <*OK*>.
- Now you are asked "The program was changed! Do you want to load the new program?". Answer this question with <*Yes*> to load the entire program.
- For safety reasons the program has to be stored in the flash memory in case that a restart of the system is required at a later time. For this, select the menu item <*Online*><*Create boot project (flash)*>. Wait until the LED on the PLC stops flashing or the message 'FLASH' is no longer displayed in the status bar at the bottom.
- Finally, start the program by pressing <*F5*>.
  The program is running.

(See documentation 907 AC 1131 part 2, software description, project management and general online functions.)
The system is now ready for operation.
If you are using a terminal, please note the following:

☞ If the error message at the MT45 does not disappear automatically, restart the complete system (disconnect both devices from the supply voltage and then switch them on again). Then the error message at the MT45 disappears and the start page is called.

5. Operating instructions

If you have carried out all described steps correctly, your system is now ready for scanning.
The scanner reads the bar codes and stores them in a telegram which is sent to the basic unit. The program in the basic unit is designed in a way that it permanently receives the incoming telegrams of the scanner. Then the telegrams are checked whether they are error-free (telegram structure check). If this is the case, the scanned bar code is filtered out of the telegram and supplied for further processing.
The scanned bar code is compared to reference telegrams stored in a table (VALID_SCANS). In case of coincidence, the assigned text is read from another table (VALID_SCAN_TEXT) and supplied for output at the terminal. If the bar code does not match a stored reference telegram, a default text is output at the terminal. The table VALID_SCAN_TEXT is already pre-initialized with values. The table containing the reference codes (VALID_SCANS) is empty at the beginning.
Therefore, the first step when taking the program into operation is to determine the reference codes. For this purpose the program provides a TEACH_MODE. In this mode all scanned bar codes are entered to the VALID_SCANS table one after the other. You can start the TEACH-MODE by either connecting input E62,0 of the PLC to 24 V DC or by forcing this input with TRUE (refer to 907 AC 1131 documentation, part 1). Now hold all bar codes which shall be entered to the reference codes table in front of the scanning window one after the other. In the program it is defined that a maximum of 10 reference codes can be entered. After all reference codes have been scanned, apply a FALSE signal to input E62,0 (apply 0 V DC to the input or delete the input by forcing with <CTRL><F7>). This will terminate the TEACH MODE.

☞ NOTE: When the TEACH MODE is entered a second time, the VALID_SCANS table is completely deleted and the new scanned telegrams are entered to the table.

Bar codes which are scanned after this are compared to the values of the reference telegrams as described above and in case of coincidence the assigned texts are output on the terminal. If no terminal is connected you can read this text from the variable "OUTPUT_TEXT".
The following information is applied to the PLC outputs:

- The outputs A63.04 and A63.5 indicate whether the communication between the scanner and the PLC is running. If the outputs are alternately flashing, the communication is ok. If both outputs are off (LEDs do not light), the connection between the scanner and the PLC is disturbed (check the connecting cable and the supply voltage of the devices).
- The outputs A63.06 and A63.7 indicate whether the communication between terminal and PLC is running. If the outputs are alternately flashing, the communication is ok. If both outputs are off (LEDs do not light), the connection between the terminal and the PLC is disturbed (check the ARCNET connection, the addresses (NODE numbers) and the supply voltage of the devices).
- The outputs A62.0 ... A62.7 display the total number of telegrams received without error.
- The outputs A62.8 ... A62.15 display the number of the reference telegram matching the scanned code.

  ☞ NOTE: If the displayed number is higher than the number of available reference telegrams, no match was detected.